Apple Response to Hashemite Kingdom of Jordan TRC Consultation "on the modification of the instructions and conditions for licensing and operating local radio communications networks"

Contact Details Raef Alfawair
ME Compliance
Apple M E FZCO Dubai Branch
Office: 302, Level 3, Building 4, Emaar Square
P.O. Box 116977, Downtown Dubai, Dubai
United Arab Emirates
iPhone: +971-56-685-5848
Direct: +971-4-3833-013
Email: alfawair@apple.com

Date 10 November 2021

Executive Summary

Apple Inc. (Apple) appreciates the opportunity to submit this filing in response to the Telecommunications Regulatory Commission (TRC) consultation "**on the modification of the instructions and conditions for licensing and operating local radio communications networks**".

Apple fully supports the TRC's objective to make more spectrum available for Wireless Local Area Networks (WLAN) including Wi-Fi. Indeed, as pointed out by TRC, the amount of spectrum currently available for WLAN in the 2.4 GHz and 5GHz bands will no longer be sufficient for supporting existing and ever-growing demand for wireless data exchange.

Apple supports making spectrum available that will benefit society and citizens, and increase overall economic value; provide transparency and predictability for all spectrum users; and maximize incentives for investment to maximize the value that spectrum provides.

We note there are increasing competing demands for access to spectrum and therefore we support the principle of technology and service neutrality enabling access to spectrum in a timely manner to the benefit of citizens and national interest.

We are pleased to see the TRC consulting and taking a leadership position in relation to the 6 GHz frequency range (5925-6425 MHz). Apple wishes to express strong support to make the 5925-6425 MHz frequency range available under a licence-exempt regulatory regime for WAS/RLAN, including Wi-Fi 6E and any other appropriate licence-exempt technologies.

We are pleased that TRC is willing to implement a balanced spectrum policy that bringing additional licence-exempt spectrum into use to serve businesses and citizens, increasing spectrum access, promoting efficient and effective spectrum use, and supporting innovation.

We hope our contribution provides the TRC with additional information to ensure an appropriate regulatory environment for the 6 GHz frequency band.

……..

1. Introduction

Apple supports enabling global licence-exempt access to the 6 GHz frequency range for Wireless Access Systems / Radio Local Area Networks (WAS/RLANs) to facilitate new services and applications including those requiring larger bandwidths (e.g. 160 MHz and in the future 320 MHz channels). We strongly encourage opening the full 6 GHz band (5925-7125 MHz) for licence-exempt usage to benefit immediately from product availability and global economies of scale.

Apple believes that immediate access to 5925-6425 MHz will help enable WAS/RLAN technologies, including Wi-Fi, to continue delivering positive experiences for the most bandwidth-intensive applications, leveraging wider channels, lower latency and additional capacity to deliver greater network performance and supporting more users at once, even in very dense and congested environments. As previously mentioned, we believe it is important to also make available the upper 6 GHz band (6425-7125 MHz) for the full potential of next generation WAS/RLAN technologies.

2. Pivotal role of WLAN including Wi-Fi

WAS/RLAN including Wi-Fi is an important for business and consumer internet connectivity overall and has become essential even for the mobile segment of internet connectivity, where worldwide Wi-Fi carries more traffic than licenced wireless technologies. This is because one of the solutions to address the growing demands for bandwidth on cellular networks has long been leveraging Wi-Fi networks, which enables mobile network operators to scale capacity to meet their subscribers' needs. From 2G to 3G, from 3G to 4G and now moving towards 5G, Wi-Fi offload continues to increase in importance and according to Cisco Visual Networking Index (VNI)[1] it is anticipated that approximately 70% of 5G offloaded traffic will be on Wi-Fi.

Cisco's VNI considers the impact that users, devices, and other trends will have on global IP networks over a five-year period, and it conclude that by 2022, more IP traffic will cross global networks than in all prior "internet years" combined up to the end of 2016. In other words, more traffic will be created in 2022 than in the 32 years since the internet started. Wi-Fi currently delivers more than half of all internet traffic and by 2022 it is estimated that 71% of total IP traffic will be wireless (Wi-Fi and Mobile); a 25% CAGR (Compound Annual Growth Rate) between 2017-2022.

In 2018, Wi-Fi economic value was nearly $2 trillion, and is expected to grow to almost $3.5 trillion by 2023[2]. Wi-Fi has become a key complementary technology for enterprise and carrier networks and is the most important technology for home connectivity. These values will only increase when next generation products and deployments become available. Currently, it is estimated that there are more than nine billion Wi-Fi devices in use, and individuals, families, governments, and global organizations depend on Wi-Fi every day.

3. Mid-Band Spectrum shortage for W-Fi

Access to licence-exempt mid-band spectrum has not kept pace with the extraordinary growth and adoption of WAS/RLAN technologies. This issue is not new and has been under consideration for number of years including two World Radiocommunication Conference four-year study periods, but with no new mid-band spectrum identified or made available for WAS/RLAN.

Ensuring sufficient licence-exempt mid-band spectrum is available is critical for supporting existing and ever-growing demand for applications and services delivered over Wi-Fi as well as playing a critical element enabling 5G applications and services where they are off-loaded to Wi-Fi. As mobile and Wi-Fi technologies evolve and continue to be integrated to meet wireless and mobile communications needs, demand for license-exempt spectrum will continue to grow.

There have been two studies undertaken to justify additional mid-band spectrum for Wi-Fi one of them was by Quotient Associates Limited on behalf of the Wi-Fi Alliance (WFA)[3]. It is important to recognize the consistency of both study conclusions even though the studies relied on entirely different methodologies and models.

---

1 Cisco 2018, VNI Global IP Traffic Forecast 2017-2022

2 https://www.wi-fi.org/news-events/newsroom/wi-fi-global-economic-value-to-reach-5-trillion-in-2025

3 Wi-Fi Alliance Spectrum Needs Study March 2017, by Quotient Associates Limited

- The "Wi-Fi Spectrum Needs Study" (undertaken by Quotient Associates Limited) concluded that between 500 MHz and 1 GHz of **additional** mid-band spectrum in various world regions may be needed to support even already-expected growth in Wi-Fi by 2020; but if demand for Wi-Fi exceeds expected growth, then between 1.3 GHz and 1.8 GHz more mid-band spectrum may be required by 2025 just to keep pace.
- Similarly, the other mid-band study[4] concluded that in dense environments that primarily rely on Wireless Local Area Networking (WLAN) networking, a total amount of approximately 1280 MHz of **additional** mid-band licence-exempt spectrum is required, centred near the existing licensed-exempt 5 GHz bands.

4. Proposed technical conditions by TRC for the 6 GHz band

Apples welcomes and supports the TRC decision to enable WLAN in 5925-6425 MHz. Furthermore, we agree and support the e.i.r.p values depicted by TRC in Clause 4, section b, i.e.;

Frequency band	Mean e.i.r.p	Comments
5925-6425 MHz	200 mW (23 dBm)	Indoor
5925-6425 MHz	25 mW (14 dBm)	Indoor and outdoor

- ٢٥ ملي واط (١٤ dBm) في النطاق (٥٩٢٥- ٦٤٢٥) ميجاهيرتز. (للأجهزة المحمولة التي يتم تشغيلها داخل و خارج المباني).
- ٢٠٠ ملي واط (٢٣ dBm) في النطاق (٥٩٢٥- ٦٤٢٥) ميجا هيرتز. (للأجهزة التي يتم تشغيلها داخل المباني فقط).

Indeed, these values correspond to those adopted in the ECC Decision (20)01, the European Commission Implementing Decision - C(2021)4240, and Recommendation ATU-R 005. By adopting these values, TRC will allow Jordan to align with the technical characteristics being already adopted in Europe and some African countries. This will benefit society and citizens, and increase overall economic value; provide transparency and predictability for all spectrum users; and maximize incentives for investment to maximize the value that spectrum provides.

The first category of devices envisioned (up to 200 mW, indoor) are known as Low Power Indoor (LPI), encompassing indoor usage including those in various transportation services. These use cases include home automation, new e-health applications, streaming video services, and the usual access point home networking applications that have been critical to facilitating education and economies worldwide during the COVID-19 pandemic. This device class delivers the connectivity to the population when at home, work, and in transit. As technologies develop in the home environment, more client-to-client and bridge-like systems come into consideration to better facilitate home automation. Apple also supports LPI devices in cars, trains, and planes to promote more connectivity solutions for transportation modes. These use cases would also fall within this indoor use low power category.

The second category of devices envisioned (up to 25 mW, indoor and outdoor) are known as Very Low Power (VLP), enabling flexibility for indoor and outdoor uses creating a localized personal area network required for the expanded use of wearables, streaming audio, and video services for portable devices. This class requires lower latency requirements, while also considering device power consumption and other considerations relevant specifically for portable mobile devices.

[4] A Quantification of 5 GHz Unlicensed Band Spectrum Needs July 2016

5. Possible future steps on 6 GHz

New WAS/RLAN standards, in particular the evolution of Wi-Fi 6E to next generation Wi-Fi known as Wi-Fi 7, will need licence-exempt access to the full 1200 MHz in the 5925-7125 MHz frequency range to support current and emerging innovative use cases. Opening only 500 MHz of the 6 GHz band would mean WAS/RLAN networks in dense deployments would have to continue to utilise smaller channel bandwidths (as only one 320 MHz channel would be available). But with access to the full 1200 MHz, larger channel bandwidths of 160 MHz, and especially 320 MHz as supported by Wi-Fi 7, could be more easily accommodated.

Wider channel bandwidths increase spectrum efficiency and deliver high-bandwidth application and services, while maintaining the ability to share spectrum with incumbents and other licence-exempt deployments. A lack of wider channels would have a detrimental impact on real-time video services and high-bandwidth immersive services, such as augmented reality and virtual reality (AR/VR).

Wi-Fi 7 will rely on up to 320 MHz channels to further improve latency, throughput, reliability, and quality of service relative to Wi-Fi 6. The U.S. Federal Communications Commission (FCC) has said: “Making the entire band available for these unlicensed operations enables use of wide swaths of spectrum, including several 160-megahertz channels, as well as 320-megahertz channels, which promotes more efficient and productive use of the spectrum, and would also help create a larger ecosystem in the 5 GHz and 6 GHz bands for U-NII devices.”

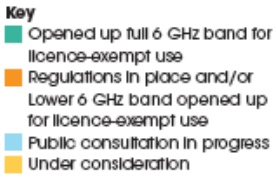
Apple believes that the TRC should make the entire 5925-7125 MHz frequency range available under license-exempt regulatory conditions.

While we respect the World Radiocommunications Conference 2019 decision to study coexistence between IMT with other incumbent services, we do not believe that these studies should delay opening 5925-7125 MHz frequency range should Administrations wish to do so.

We also do not believe an IMT identification is needed in any part of the 5925-7125 MHz frequency range as this would deny the businesses and citizens the benefits of next generation of Wi-Fi technologies. 5925-7125 MHz is the world-wide home for the future of Wi-Fi and chipmakers and device makers are building technology to meet this worldwide market.

It is important to note that other Administrations have already taken the decision to release, or are in the processes of releasing, the entire 6 GHz band (5925-7125 MHz) as depicted[5].

[5] GOVERNMENTS ACROSS THE WORLD ARE MAKING THE 6 GHZ BAND AVAILABLE ON A LICENCE-EXEMPT BASIS



6. Conclusion

We are pleased to see the TRC consulting and taking a leadership position in relation to the 6 GHz frequency range (5925-6425 MHz). Apple wishes to express strong support to make the 5925-6425 MHz frequency range available under a licence-exempt regulatory regime for WAS/RLAN, including Wi-Fi and any other appropriate licence-exempt technologies.

Apple recommends adopting the best international regulatory practice for the 6 GHz band, including a long-term vision for future Wi-Fi evolvement, as this has significant benefits including global economies of scale and will benefit Jordan's society, citizens, and industry.